

## CLAIMS

1. An apparatus for treating waste comprising:
  - (a) a vessel; and
  - (b) at least two AC plasma torches mounted with the vessel, wherein  
5 the AC plasma torches each include a variable flame.
2. The apparatus for treating waste of claim 1 wherein the vessel contains an open space and includes a bowl-shaped portion.
3. The apparatus for treating waste of claim 2 wherein the AC plasma torches  
10 are mounted with the vessel such that they do not penetrate the open space contained in the vessel.
4. The apparatus for treating waste of claim 2 wherein the vessel is generally a horizontally oriented structure.
5. The apparatus for treating waste of claim 3 wherein the AC plasma torches  
15 include a torch gas that has a flow rate, and wherein the flow rate of the torch gas can be adjusted to vary the flames of the AC plasma torches.
6. The apparatus for treating waste of claim 3 wherein a current is applied to the AC plasma torches, and wherein the current can be adjusted to vary the flames of the AC plasma torches.
7. The apparatus for treating waste of claim 3 further comprising at least one  
20 door that can separate one of the plasma torches from the open space in the vessel.
8. The apparatus for treating waste of claim 4 wherein the AC plasma torches are vertically mounted on the vessel with the flames generated by the AC plasma torches extending down through the open space and contacting the bowl-shaped portion of the vessel.
9. The apparatus for treating waste of claim 8 further comprising a feeding  
25 system connected to the vessel comprising a charging hopper and a feeding hopper, wherein the feeding hopper includes a airlock door on a side through which waste can be introduced into the feeding hopper.
10. The apparatus for treating waste of claim 9 further comprising a purging  
30 system connected to the feeding system.

11. The apparatus for treating waste of claim 10 further comprising at least one tap positioned in the vessel through which treated waste may be drained.
12. The apparatus for treating waste of claim 11 further comprising at least one solid residue handling system comprising a tap cart connected to the tap.
- 5 13. The apparatus for treating waste of claim 12 wherein at least two taps are positioned in the vessel.
14. The apparatus for treating waste of claim 13 further comprising:
- (a) a disinfectant system connected with the feed system; and
  - (b) a vent system interconnecting the feed system and the vessel.
- 10 15. The apparatus for treating waste of claim 14 further comprising:
- (a) a venturi flow meter connected with the vessel.
16. The apparatus for treating waste of claim 15 further comprising:
- (a) a quencher connected with the vessel;
  - (b) a recirculation tank connected with the quencher;
  - 15 (c) a scrubber connected to the recirculation tank;
  - (d) a water supply system connected to the recirculation tank; and
  - (e) a neutralizing agent supply system connected to the recirculation tank.
17. The apparatus for treating waste of claim 16 further comprising:
- 20 (a) a wastewater treatment system connected with the recirculation tank; and
  - (b) a particulate recycling system connected with the wastewater treatment system.
18. A method for treating waste comprising:
- 25 (a) providing an AC torch with a variable flame;
  - (b) providing waste;
  - (c) adjusting the flame in accordance with a type of waste to be treated;
- and
- (d) heating the waste with energy generated by the flame.
- 30 19. The method for treating waste according to claim 18 wherein the waste is comprised of solid waste and liquid waste.

20. The method for treating waste according to claim 18 further comprising:
- (a) melting or vitrifying the waste;
  - (b) forming a pool of the melted or vitrified waste; and
  - (c) quenching the melted or vitrified waste.
- 5 21. The method for treating waste according to claim 20 further comprising:
- (a) dissociating the waste into elemental components;
  - (b) gasifying the waste; and
  - (c) reforming the elemental components as carbon monoxide gas and hydrogen gas.
- 10 22. The method for treating waste according to claim 21 wherein the step of dissociating the waste destroys the hazardous constituency of at least part of the waste and is accomplished through pyrolysis of the waste.
23. The method for treating waste according to claim 22 further comprising:
- (a) providing oxygen; and
- 15 (b) combining the oxygen with the elemental components to form carbon monoxide gas.
24. The method for treating waste according to claim 23 further comprising:
- (a) providing excess oxygen; and
  - (b) combining the oxygen with the elemental components to form
- 20 carbon dioxide gas.
25. The method for treating waste according to claim 24 further comprising:
- (a) cooling the carbon monoxide gas and hydrogen gas;
  - (b) removing carbon particulate from the carbon monoxide gas and hydrogen gas; and
- 25 (c) neutralizing any acid gases contained with the carbon monoxide gas and hydrogen gas.
26. The method for treating waste according to claim 25 further comprising:
- (a) adding a reducing agent or fluxing agent to the waste before performing the step of heating the waste with energy from the flame.

27. The method for treating waste according to claim 26 wherein the treatment of the waste results in a synthesis gas with about 45-55% hydrogen gas and about 30-40% carbon monoxide gas.

28. A method for treating waste comprising:

5 (a) providing waste, wherein the waste includes an inorganic portion and an organic portion;

(b) providing a vessel with at least two AC plasma torches mounted therein;

(c) introducing the waste into the vessel;

10 (d) generating a flame with one of the AC plasma torches; and

(e) heating the waste with the energy from the flame.

29. The method for treating waste according to claim 28 further comprising:

(a) melting or vitrifying the inorganic portion of the waste; and

(b) gasifying and dissociating the organic portion of the waste.

15 30. The method for treating waste according to claim 29 wherein the steps (a) and (b) are performed simultaneously.